

TRI-PARTY AGREEMENT

Change Notice Number

TPA-CN- 0820

TPA CHANGE NOTICE FORM

Date:

6/19/18

Document Number, Title, and Revision:

DOE/RL-2014-42, Rev. 0, 300-FF-5 Operable Unit Remedy Implementation Sampling and Analysis Plan, Rev. 0

Date Document Last Issued:

September 2015

Approved Change Notices Against this Document: TPA-CN-0762

Originator: D.A. St. John

Phone: 373-9775

Description of Change:

The sampling and analysis plan is updated in Chapter 3 and Appendix A to include 1 new groundwater well in the 300-FF-5 Operable Unit.

M. W. Cline

and B. W. Simes

agree that the proposed change

DOE

Lead Regulatory Agency

modifies an approved workplan/document and will be processed in accordance with the Tri-Party Agreement Action Plan, Section 9.0, *Documentation and Records*, and not Chapter 12.0, *Changes to the Agreement*.

One new groundwater well is added to the remedy implementation sampling and analysis plan for the 300-FF-5 Operable Unit, DOE/RL-2014-42, Rev. 0. The well was installed as a replacement groundwater monitoring well at the former 316-4 Crib. Minor correction is also made to Table 3-6 to correct a well name.

Additions are shown using double underline. Deletions are shown using ~~strikeout~~. Figure 3-5 is replaced with a new figure as indicated by strikeout on old figure.

Note: Include affected page number(s): page 3-14, 3-21, 3-24, A-14, A-20, A-41

Justification and Impacts of Change:

Groundwater well 699-S6-E3 (C9870) was drilled as a replacement groundwater monitoring well at the former 316-4 Crib. The sampling and analysis plan is modified to add this well to the 300-FF-5 Operable Unit long-term groundwater monitoring network.

Approvals:

DOE Project Manager

Date

7/2/2018

☒ Approved ☐ Disapproved

EPA Project Manager

Date

7/2/2018

☒ Approved ☐ Disapproved

N/A

☐ Approved ☐ Disapproved

Ecology Project Manager

Date

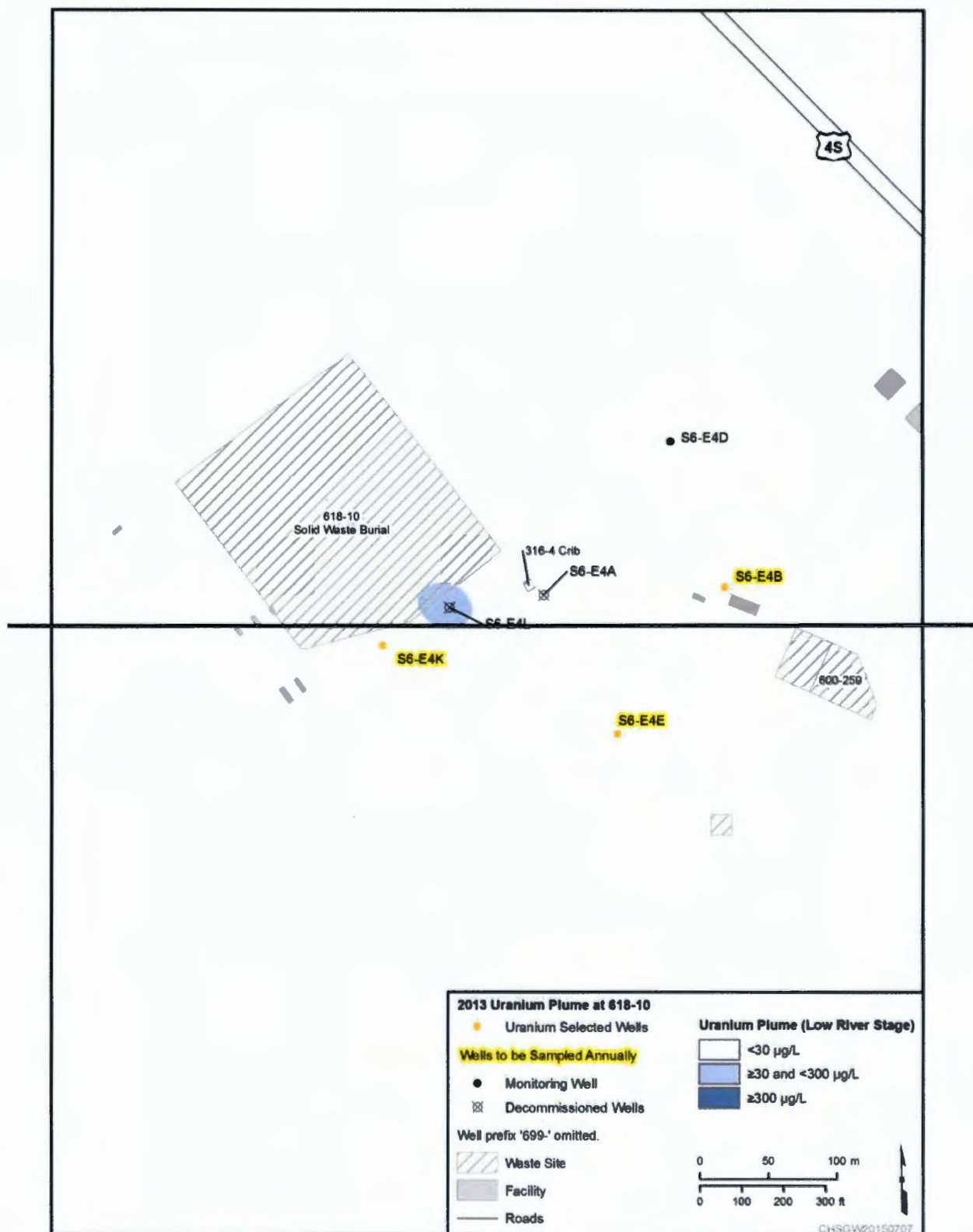


Figure 3-5. Groundwater Sampling Network for Uranium at the 618-10 Burial Ground/316-4 Crib

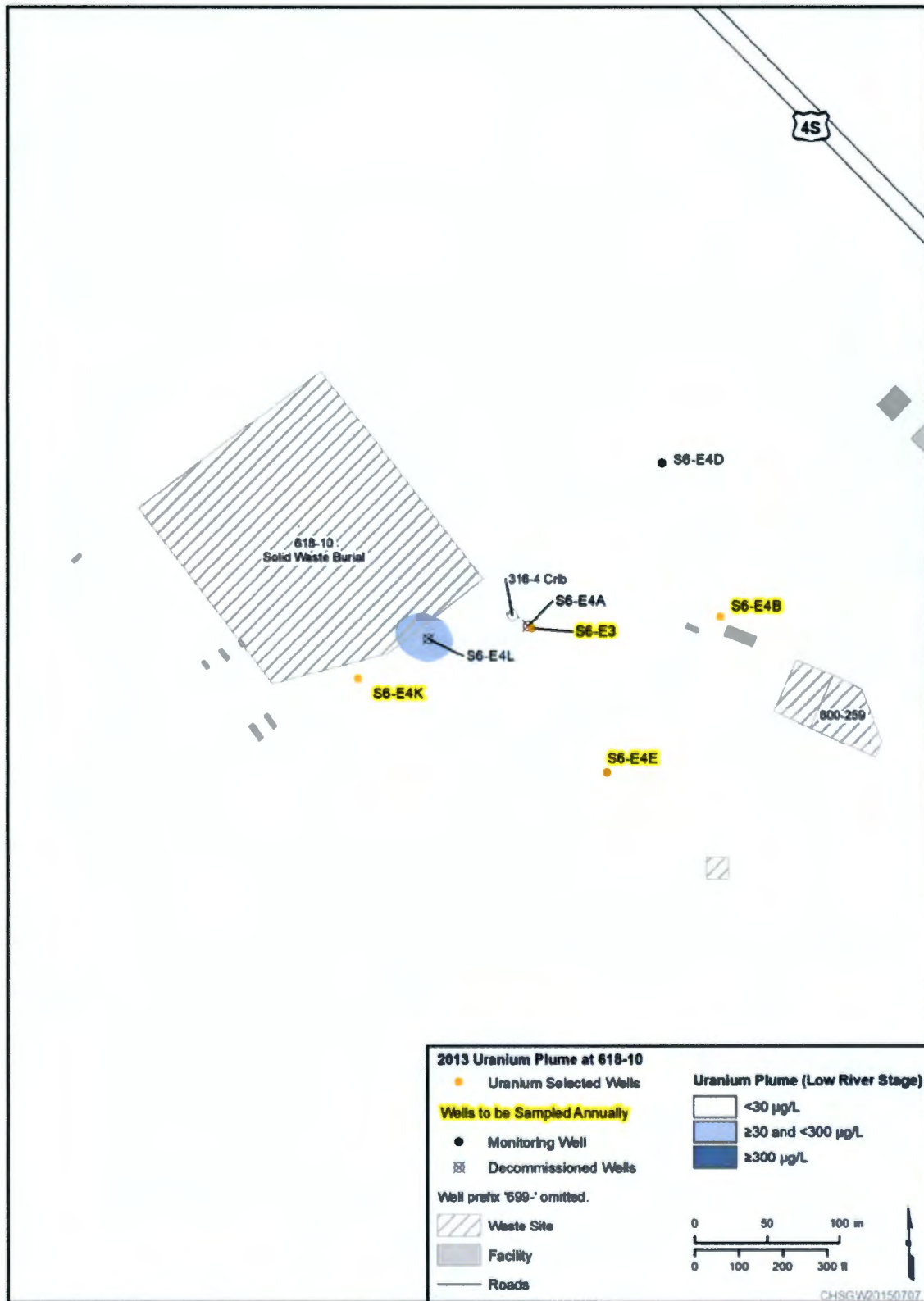


Figure 3-5. Groundwater Sampling Network for Uranium at the 618-10 Burial Ground/316-4 Crib

Table 3-6. Sample Locations, Frequencies, and Analytes

| Well Name | Type | Screened Unit | Year Constructed | Uranium Sample/River Stage | PSQ | Water Level | | Years 1 through 5 Frequency | | | | | | Comment/Rationale |
|-------------|------------------|---------------|------------------|----------------------------|------|-------------|--------|-----------------------------|---------|-------------|-----|---------|-------------|--|
| | | | | | | Automated | Manual | Uranium | Tritium | cis-1,2-DCE | TCE | Nitrate | Gross Alpha | |
| 399-8-5A | Groundwater Well | TU | 1991 | Low | 1, 2 | X | B | B | | | | | B | U: Monitor 618-7 uranium plume. |
| 699-12-2C | Groundwater Well | TU | 2001 | N/A | 1, 4 | | B | | B | | | B | | U: No monitoring objective for uranium. H3: In plume; monitor trends. NO3: In plume; monitor trends. |
| 699-13-0A | Groundwater Well | TU | 2001 | N/A | 1, 4 | | B | | B | | | | | U: No monitoring objective for uranium. H3: In plume; monitor trends. |
| 699-13-1E | Groundwater Well | TU | 2001 | N/A | 1, 4 | | B | | B | | | B | | U: No monitoring objective for uranium. H3: In plume; monitor trends. NO3: >DWS until 2014; monitor trend. |
| 699-13-2D | Groundwater Well | TU | 2001 | N/A | 1, 4 | | B | | B | | | B | | U: No monitoring objective for uranium. H3: In plume; monitor trends. NO3: At or above DWS; monitor trend. |
| 699-13-3A | Groundwater Well | TU | 1995 | N/A | 1, 4 | | B | | B | | | B | | U: No monitoring objective for uranium. H3: In plume; monitor trends. NO3: In plume; monitor trends. |
| 699-S6-E4B | Groundwater Well | TU | 1953 | N/A | 1 | | A | A | | | | | A | U: Monitor 618-10/316-4 uranium plume. |
| 699-S6-E4E | Groundwater Well | TU | 1953 | N/A | 1 | | A | A | | | | | A | U: Monitor 618-10/316-4 uranium plume. |
| 699-S6-E4K | Groundwater Well | TU | 2003 | N/A | 1 | | A | A | | | | | A | U: Monitor 618-10/316-4 uranium plume. |
| 699-S6-E3 | Groundwater Well | TU | 2018 | N/A | 1 | | A | A | | | | | A | U: Monitor 618-10/316-4 uranium plume |
| 699-S27-E14 | Groundwater Well | TU | 1948 | N/A | 2 | X | | | | | | | | No COC monitoring objective for uranium. |
| AT-3-7-M | Aquifer Tube | 6.3* | 2004 | Low | 4 | | | 5 | | | | | 5 | U: Delimit southern extent of the plume. |

When the concentration of a COC at a well achieves the CUL, attainment monitoring will begin. During attainment monitoring, wells will be sampled quarterly for up to 2 years to detect seasonal variability (Appendix A). If attainment has not been achieved, monitoring may be continued at a reduced frequency.

The criteria that were used to identify the wells to be monitored to answer each of the principal study questions (PSQs) of the DQO, and to determine the sampling frequency to be employed, are provided in Appendix A. Some wells are co-sampled with other monitoring programs (e.g., monitored to meet RCRA requirements). Monitoring requirements for those programs are described in separate plans. The reported data from those networks is supplementary to information gathered under this SAP. The breakdown of the well networks to answer individual PSQs is discussed in Section 3.5.2.1.

3.5.2.1 Monitoring Network

This SAP organizes the wells according to the relevant PSQ. An analysis of the well network to identify those wells needed for performance monitoring is presented in the DQO report in Appendix A.

PSQ 1: Are the COCs attenuating according to expectations?

The monitoring wells for PSQ 1 were selected based on location to evaluate the extent of contamination, migration pathways, contaminant trends, and contaminant concentration relative to CULs.

The sampling locations and frequency for each COC are provided as follows. The sampling frequencies for each COC monitoring network are summarized in Table 3-7.

1. **TCE:** Eight wells (399-1-7, 399-2-1, 399-2-2, 399-3-12, 399-3-20, 399-4-12, 399-4-7, and 399-4-9) in the 300 Area Industrial Complex are in the TCE monitoring network (Figure 3-7, Table 3-6) and have reached the CUL for TCE; one well (399-4-14) has not reached the CUL. Well 399-4-14 will be sampled quarterly during March, June, September, and December.
2. **cis-1,2-DCE:** Two wells (399-1-16B and 399-1-57) in the 300 Area Industrial Complex will be monitored every 5 years during December to be consistent with the historical monitoring period, 2 years before the five-year review timeframe (Figure 3-8, Table 3-6).
3. **Uranium and gross alpha:** Ten wells in the 300 Area Industrial Complex (399-1-1, 399-1-16A, 399-1-17A, 399-1-55, 399-1-7, 399-2-1, 399-2-2, 399-3-9, 399-4-7, and 399-4-10) will be monitored biennially in June or December, when highest concentrations are anticipated based on correlation of concentrations to the river stage (Figure 3-4, Table 3-6). Two wells (399-8-1 and 399-8-5A) downgradient of the 618-7 Burial Ground will be monitored biennially during December to be consistent with the historical monitoring period. ~~Four~~ Three wells (699-S6-E4B, 699-S6-E4E, and 699-S6-E4K, ~~and 699-S6-E3~~) downgradient of the 618-10 Burial Ground/316-4 Crib will be monitored annually during December to be consistent with the historical monitoring period. Additional wells will be sampled for uranium as part of PSQ 2 and PSQ 4.
4. **Tritium:** Five wells (699-12-2C, 699-13-2D, 699-13-0A, 699-13-1E, and 699-13-3A) downgradient of the 618-11 Burial Ground will be monitored biennially during October to be consistent with the historical monitoring period (Figure 3-5, Table 3-6). If concentrations increase in the furthest downgradient well (699-13-0A), installation of an additional well(s) further downgradient will be considered.
5. **Nitrate:** Four wells (699-12-2C, 699-13-2D, 399-13-1E, and 699-13-3A) downgradient of the 618-11 Burial Ground will be monitored biennially during October to be consistent with the historical monitoring period (Figure 3-6, Table 3-6).

Table A-6. Data Needs to Address PSQs

| DQO Step 2 | DQO Step 3 | DQO Steps 3 through 7 | DQO Steps 3 through 7 | DQO Steps 3 through 7 | DQO Steps 3 through 7 | DQO Step 1 |
|------------|---|--|---|--|---|--------------------------------|
| PSQ | Data Need ^a | Data Uses | Measurement Type | Measurement Location | Measurement Frequency | MNA Guidance Step ^b |
| | | <ul style="list-style-type: none"> Consider 5-year updates to monitoring program based on PSQ 4 evaluations. | | | | |
| | c. Uranium and gross alpha concentrations downgradient of 618-7 Burial Ground | <p>Determine whether uranium and gross alpha concentrations downgradient of 618-7 are attenuating as expected, and assess whether concentrations have reached the CUL (i.e., remediation monitoring has been completed).</p> <p>Evaluation Methods:</p> <ul style="list-style-type: none"> Statistical analysis. Consider 5-year updates to monitoring program based on PSQ 4 evaluations. | Representative unfiltered groundwater samples submitted for quantitative analysis of uranium and gross alpha using methods in Table A-7 | 2 wells (399-8-1 and 399-8-5A) that define contamination trends (Figures A-10 and A-11, Table A-12) | Biennial during December to be consistent with the historical monitoring period | 1, 3, 4, and 5 |
| | d. Uranium and gross alpha concentrations downgradient of 618-10 Burial Ground/316-4 Crib | Determine whether uranium and gross alpha concentrations downgradient of 618-10/316-4 are attenuating as expected, and assess whether concentrations have reached the CUL (i.e., remediation monitoring has been completed). | Representative unfiltered groundwater samples submitted for quantitative analysis of uranium and gross alpha using methods in Table A-7 | 43 wells (699-S6-E4B, 699-S6-E4E, and 699-S6-E4K, and 699-S6-E3^d) that define contamination trends (Figures A-12 and A-13, Table A-12) | Annual during December to be consistent with the historical monitoring period | 1, 3, 4, and 5 |

Table A-6. Data Needs to Address PSQs

| DQO Step 2 | DQO Step 3 | DQO Steps 3 through 7 | DQO Steps 3 through 7 | DQO Steps 3 through 7 | DQO Steps 3 through 7 | DQO Step 1 |
|---|--|---|--|--|---|--------------------------------|
| PSQ | Data Need ^a | Data Uses | Measurement Type | Measurement Location | Measurement Frequency | MNA Guidance Step ^b |
| 4. Have the lateral extents of the uranium, tritium, and nitrate groundwater contamination plumes above CULs changed? | a. Uranium concentrations in the 300 Area Industrial Complex and nitrate and tritium concentrations downgradient of 618-11 | Track and communicate changes in the lateral extents of the uranium, tritium, and nitrate plumes above the CULs. Evaluation Method: • Plume mapping | Representative unfiltered groundwater samples, submitted for quantitative analysis of uranium, tritium, and nitrate using methods in Table A-7 | Uranium: Groundwater wells identified for PSQs 1b, 1c, and 2b, plus an additional 14 wells (399-1-2, 399-1-10A, 399-1-11, 399-1-12, 399-1-21A, 399-2-32, 399-3-6, 399-3-12, 399-3-20, 399-4-1, 399-4-11, 399-4-12, 399-4-15, 399-6-3) and 1 aquifer tube (AT-3-7-M) that define the lateral extent of the uranium plume above the CUL in the 300 Area Industrial Complex (Figures A-10 and A-11, Table A-12). Tritium and nitrate: Groundwater wells identified for PSQ 1e (Figures A-14 through A-17, Table A-12). | Uranium: Consistent with PSQs 1c and 2b, plus an additional set of wells at least once before each five-year review period during high (June) and low (December) river stage. Nitrate and tritium: Consistent with PSQ 1e. | 4 |

Note: Complete reference citations are provided in Chapter 9.

a. All nitrate measurements should be reported as NO₃ for consistency with the CUL.

b. From EPA 600/R-11/204, *An Approach for Evaluating the Progress of Natural Attenuation in Groundwater*.

c. Source remediation projects will be responsible for monitoring new or continuing releases of contaminants to the environment resulting from source remediation that could impact the effectiveness of the MNA remedy.

d. Well 699-S6-E3 was drilled and constructed in 2018 at the former 316-4 Crib as a replacement well for well 699-S6-E4A, which was decommissioned to support the waste site remediation, in accordance with page viii of DOE/RL-2017-49, *Cleanup Verification Package for the 316-4 Liquid Waste Disposal Crib*.

2-D = two-dimensional

AWLN = Automated Water Level Network

CUL = cleanup level

DCE = dichloroethene

DO = dissolved oxygen

DQO = data quality objective

EPA = U.S. Environmental Protection Agency

ERT = electrical resistivity tomography

MNA = monitored natural attenuation

ORP = oxidation reduction potential

PRZ = periodically rewetted zone

PSQ = principal study question

SAP = sampling and analysis plan

TCE = trichloroethene

A9 References

- DOE/RL-2010-99, 2013, *Remedial Investigation/Feasibility Study for the 300-FF-1, 300-FF-2, and 300-FF-5 Operable Units*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at:
<http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0088359>.
<http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0088307>.
<http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0088306>.
<http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0088305>.
- DOE/RL-2011-47, 2013, *Proposed Plan for Remediation of the 300-FF-1, 300-FF-2, and 300-FF-5 Operable Units*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: <http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0088360>.
- DOE/RL-2014-13-ADD2, 2014, *Remedial Design Report/Remedial Action Work Plan Addendum for the 300 Area Groundwater*, Draft A, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at:
<http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0085433>.
- DOE/RL-2014-32, 2014, *Hanford Site Groundwater Monitoring Report for 2013*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at:
<http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0084842>.
- DOE/RL-2017-49, 2018, *Cleanup Verification Package for the 316-4 Liquid Waste Disposal Crib*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: <https://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0066399H>.
- EPA and DOE, 2013, *Hanford Site 300 Area Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1*, U.S. Environmental Protection Agency and U.S. Department of Energy, Richland, Washington, Richland, Washington. Available at:
<http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0087180>.
- EPA/240/B-06/001, 2006, *Guidance on Systematic Planning Using the Data Quality Objectives Process*, EPA QA/G-4, Office of Environmental Information, U.S. Environmental Protection Agency, Washington, D.C. Available at: <http://www.epa.gov/QUALITY/qs-docs/g4-final.pdf>.
- EPA-600/4-79-020, 1983, *Methods for Chemical Analysis of Water and Wastes*, Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio. Available at: <http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196019611>.
- EPA 600/R-11/204, 2011, *An Approach for Evaluating the Progress of Natural Attenuation in Groundwater*, Office of Research and Development, National Risk Management Research Laboratory, U.S. Environmental Protection Agency, Ada, Oklahoma. Available at:
<http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100DPOE.pdf>.
- NAVD88, 1988, *North American Vertical Datum of 1988*, National Geodetic Survey, Federal Geodetic Control Committee, Silver Spring, Maryland. Available at: <http://www.ngs.noaa.gov/>.
- OSWER 9283.1-44, 2014, *Recommended Approach for Evaluation Completion of Groundwater Restoration Remedial Actions at a Groundwater Monitoring Well*, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C. Available at:
<http://www.epa.gov/superfund/health/conmedia/gwdocs/pdfs/GWcompletion-recommendedapproach-final-8.4.2014.pdf>.